

Title: DECENTRALIZED OPERATING SYSTEM

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Title: DECENTRALIZED OPERATING SYSTEM Georgios Chrysanthakopoulos et al. MSFT121368 Inventors: Docket No.: DRAFT 5/24 310F -310E 318B 310DDISTRIBUTED **OPERATING** SERVICE SYSTEM 316B 314B NETWORK DISTRIBUTED **OPERATING** SYSTEM SERVICE 310C 310B-

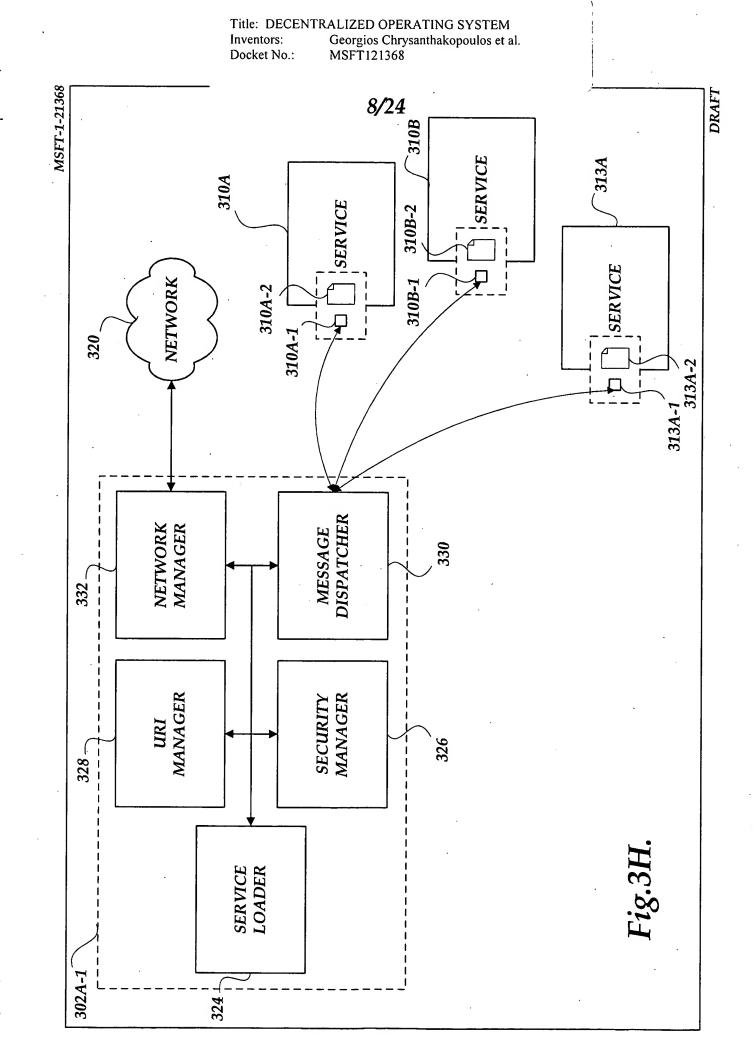
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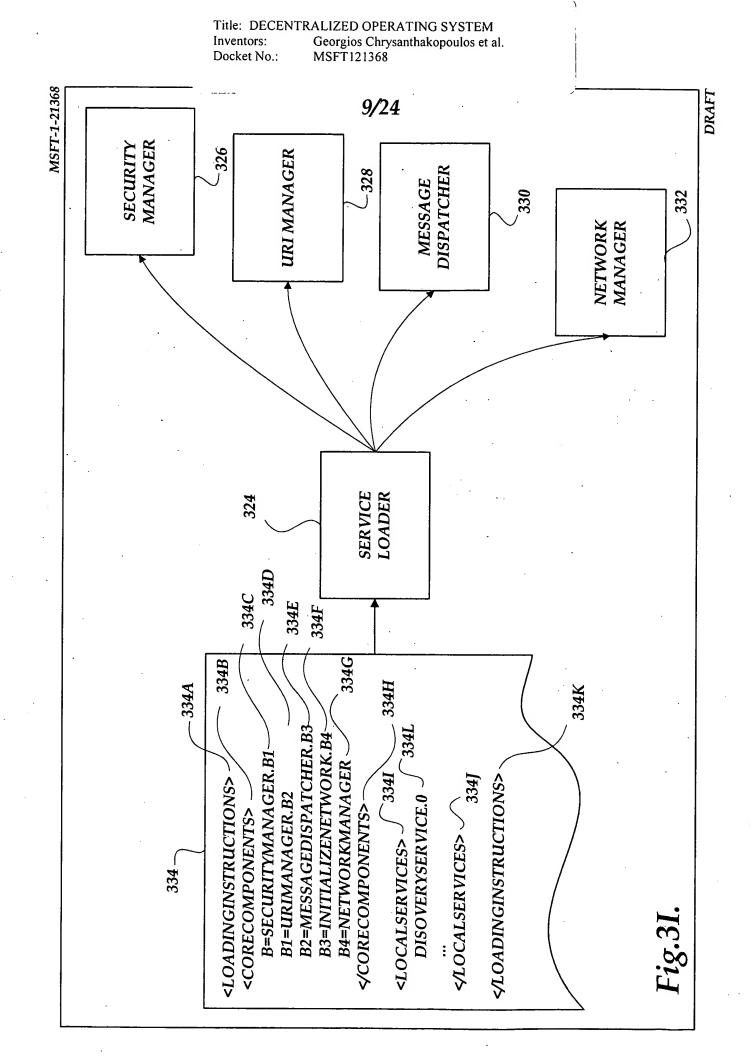
MSFT-1-21368

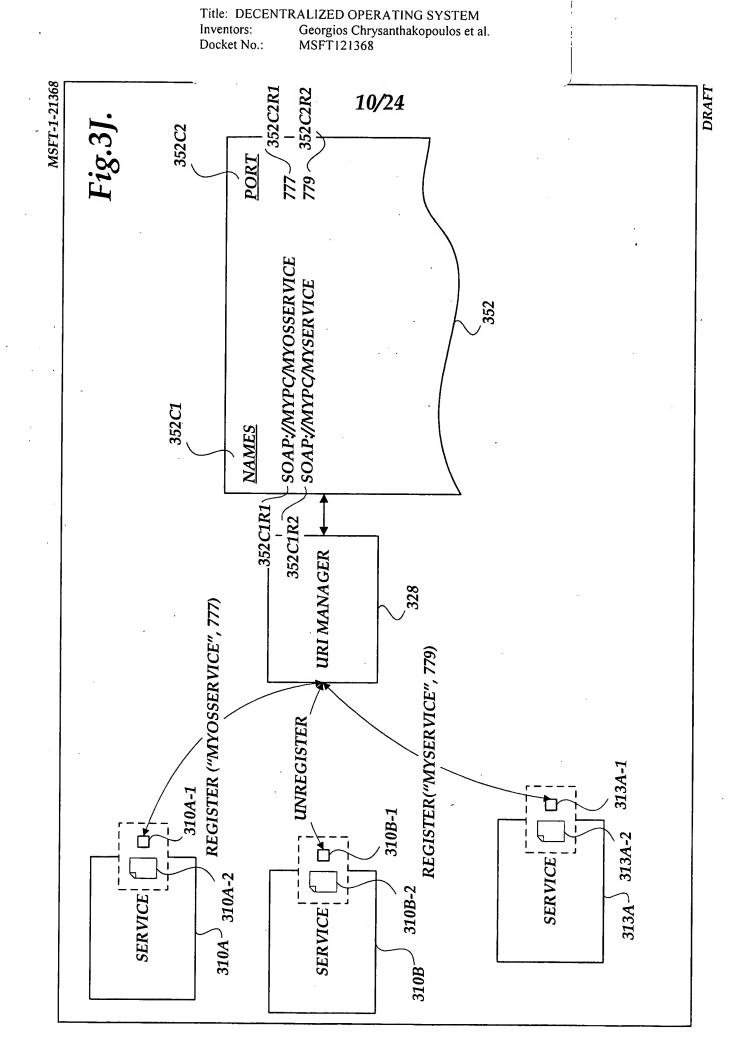
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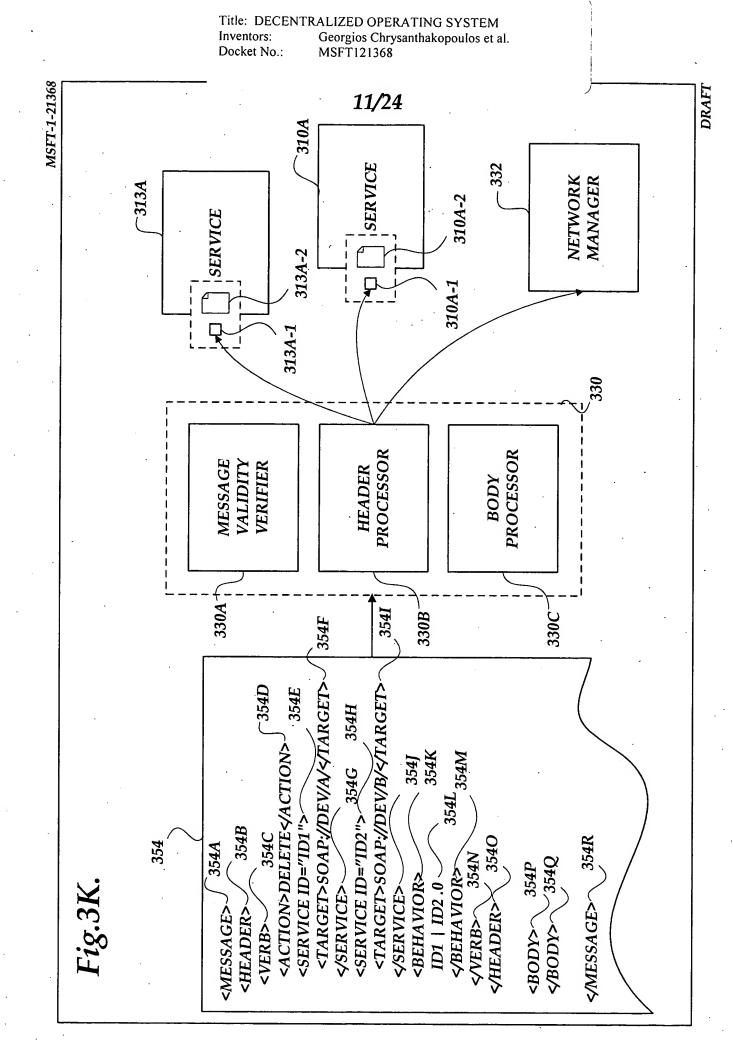
Georgios Chrysanthakopoulos et al. MSFT121368 Inventors: Docket No.: MSFT-1-21368 DRAFT 6/24 302B-2 302B-1 302B-3 310F 310E 316B DISTRIBUTING PROCESS KERNEL OS KERNEL SERVICE DEVICE DRIVER KERNEL \_314B 個 0000 0000 0000 0000 310D 302BFig.3F. NETWORK 320 302A 310C 311C DISTRIBUTING 318A OS KERNEL SERVICE **PROCESS** KERNEL KERNEL DEVICE DRIVER 316A 310B 311B 302A-2 302A-3 302A-1 310A 311A 314A

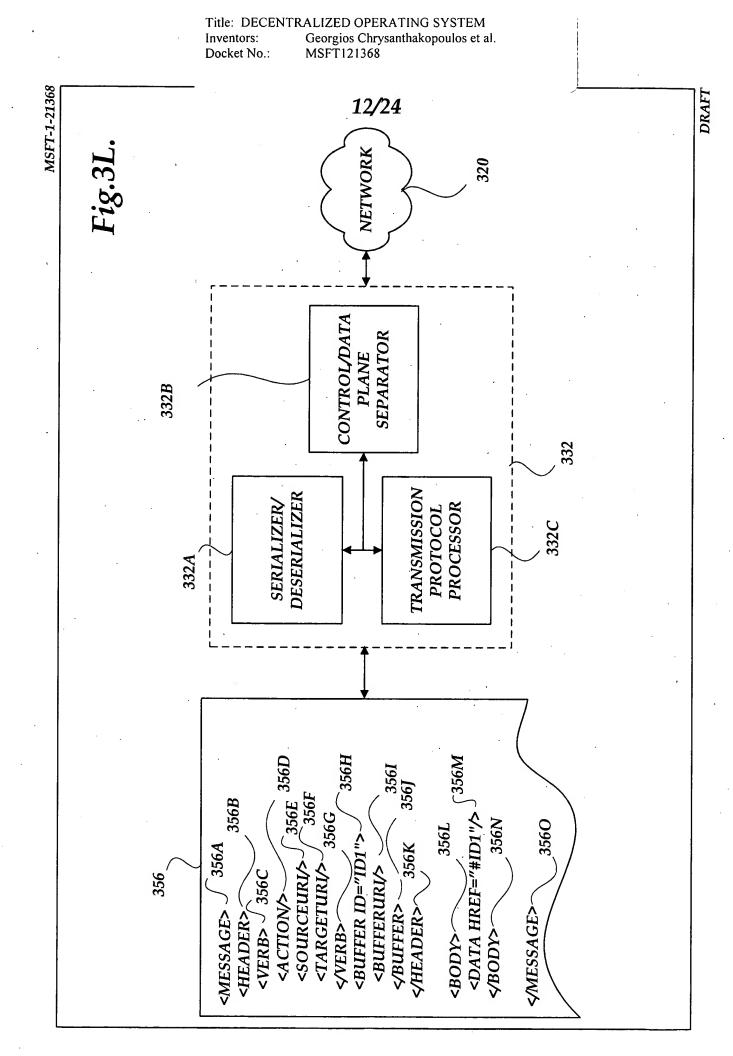
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Docket No.: Georgios Chrysanthakopoulos et al. MSFT121368 MSFT-1-21368 7/24 318B 302B-1 310F SERVICE 310E 313F DISTRIBUTING 316B SERVICE **PROCESS** SERVICE KERNEL KERNEL 313E 314B 310D SERVICE 302B 313D Fig.3G. NETWORK 320 302ASERVICE 310C 318A 313C DISTRIBUTING PROCESS KERNEL SERVICE KERNEL SERVICE 0000 0000 0000 0000 316A \ 313B 310B SERVICE 302A-1 310A 314A 313A

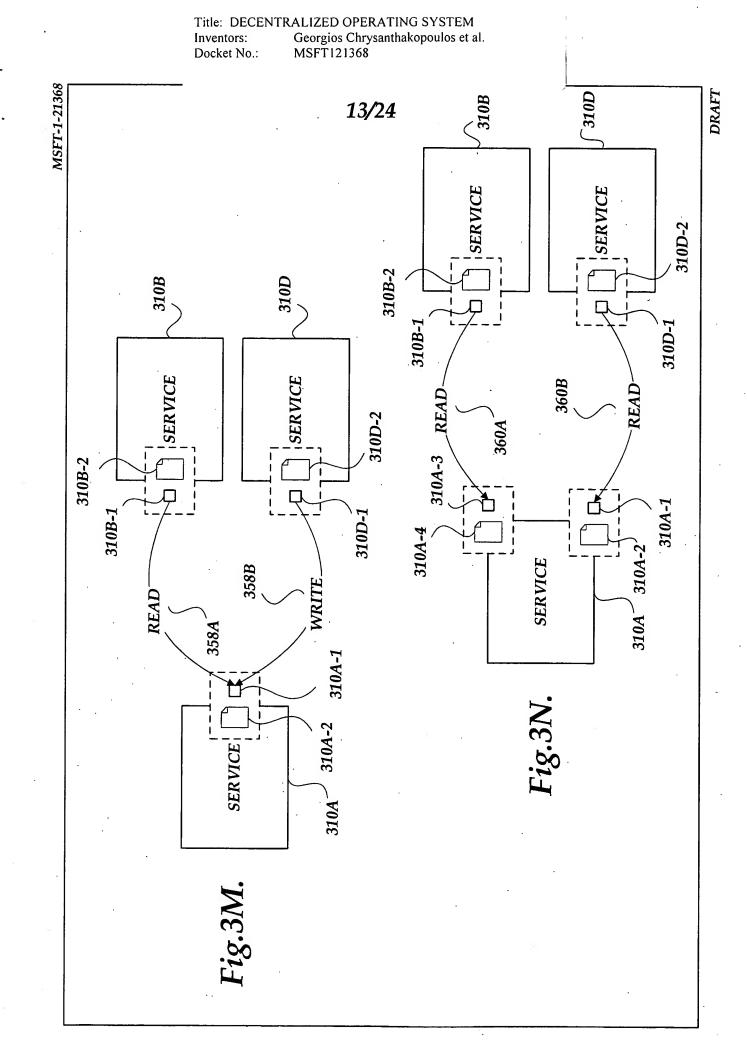












MSFT-1-21368

Inventors: Georgios Chrysanthakopoulos et al. MSFT121368 Docket No.: DRAFT MSFT-1-21368 16/24 START A METHOD FOR EXECUTING A DECENTRALIZED OPERATING SYSTEM 400 THE METHOD INITIALIZES THE 402 DECENTRALIZED OPERATING SYSTEM (SEE FIGS. 4A-4C) SERVICES ARE EXPOSED BY REGISTERING 404 THEMSELVES WITH THE URI MANAGER (SEE FIGS. 4D-4E) SERVICES COMMUNICATE WITH EACH OTHER TO ACCOMPLISH WORK VIA THE 406 DECENTRALIZED OPERATING SYSTEM (SEE FIGS. 4F-4I) **FINISH** Fig.4A.

Title: DECENTRALIZED OPERATING SYSTEM Inventors: Georgios Chrysanthakopoulos et al. Docket No.: MSFT121368 DRAFT MSFT-1-21368 Fig.4B. *17/*24 400 A SERVICE LOADER READS LOADING 408 INSTRUCTIONS WRITTEN IN A CUSTOMIZABLE, TAG-BASED LANGUAGE THE SERVICE LOADER LOADS 410 THE SECURITY MANAGER THE SERVICE LOADER 412 LOADS THE URI MANAGER THE SERVICE LOADER 414 LOADS THE MESSAGE **DISPATCHER** THE METHOD INITIALIZES ONE OR MORE 416 NETWORK DRIVERS FOR ONE OR MORE **NETWORK CONTROLLERS** THE SERVICE LOADER LOADS 418 THE NETWORK MANAGER

Inventors: Georgios Chrysanthakopoulos et al. Docket No.: MSFT121368 DRAFT MSFT-1-21368 18/24 Fig.4C. 400 420 IS THERE A NETWORK **PROTOCOL BINDING?** YES THE NETWORK MANAGER CAN EXCHANGE MESSAGES BASED ON THE SOAP PROTOCOL THE SERVICE LOADER LOADS 424 LOCAL SERVICES SPECIFIED IN THE LOADING INSTRUCTIONS NO · THE NETWORK MANAGER IS UNLOADED 426 AND MESSAGES IS TO BE EXCHANGED AMONG LOCAL SERVICES

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Inventors: Georgios Chrysanthakopoulos et al. Docket No.: MSFT121368 DRAFT MSFT-1-21368 20/24 Fig.4E. 400 THE URI MANAGER AFFIXES A 436 PREFIX TO THE UNIQUE NAME AND CREATE A URI THE URI MANAGER ASSOCIATES THE URI 440 WITH A PORT AND WRITES SUCH AN ASSOCIATION TO A MAPPING TABLE THE URI MANAGER SPAWNS A LISTENING **44**2 SERVICE TO LISTEN TO INCOMING MESSAGES FOR THE REGISTERED SERVICE 444 ARE THERE **MORE SERVICES TO** BE REGISTERED? YES

Inventors: Georgios Chrysanthakopoulos et al. Docket No.: MSFT121368 DRAFT MSFT-1-20555 21/24 400 Fig.4F. ·NO 446 DOES A SERVICE **E1** WANT TO SEND A **MESSAGE?** YES THE SERVICE SELECTS A 448 **VERB FOR COMMUNICATION** IF DATA IS INVOLVED, THE SERVICE CREATES A 450 REFERENCE FOR EACH MEMORY BUFFER IN WHICH A PORTION OF THE DATA IS STORED THE SERVICE CREATES A MESSAGE (USING A 452 CUSTOMIZABLE, TAG-BASED LANGUAGE) THAT PREFERABLY COMPLIES WITH THE SOAP PROTOCOL EACH REFERENCE TO THE MEMORY 454 BUFFER IS PREFERABLY PLACED IN THE HEADER OF THE MESSAGE THE BODY OF THE MESSAGE MAKES 456 REFERENCES TO EACH REFERENCE IN CONNECTION WITH THE VERB

Title: DECENTRALIZED OPERATING SYSTEM Inventors: Georgios Chrysanthakopoulos et al. Docket No.: MSFT121368 DRAFT MSFT-1-21368 22/24 **400** Fig.4G. THE SERVICE PASSES 458 THE MESSAGE TO THE **MESSAGE DISPATCHER** 460 **DOES THE** MESSAGE COMPLIES WITH THE SOAP PROTOCOL? YES THE MESSAGE DISPATCHER PROCESSES 462 THE HEADER OF THE MESSAGE TO **DETERMINE THE DESTINATION** 464 IS THE **DESTINATION A** LOCAL SERVICE? YES NO

Inventors: Georgios Chrysanthakopoulos et al. Docket No.: MSFT121368 DRAFT MSFT-1-21368 23/24 400 Fig.4H. THE MESSAGE DISPATCHER PASSES 466 THE MESSAGE, IN INFOSET FORM, DIRECTLY TO THE LOCAL SERVICE THE MESSAGE DISPATCHER PASSES THE 468 MESSAGE TO THE NETWORK MANAGER IN A FIRST COMPUTING MACHINE THE NETWORK MANAGER PROCESSES TAGS IN THE MESSAGE 470 THAT REFERENCE BUFFERS IN THE MEMORY OF THE FIRST COMPUTER SYSTEM TO STORE PIECES OF DATA THE NETWORK MANAGER SERIALIZES THE 472 MESSAGE INCLUDING THE TAGS REFERENCING THE BUFFERS USING A SERIALIZER THE NETWORK MANAGER USES THE CONTROL/DATA 474 PLANE SEPARATOR TO PREPARE THE SERIALIZED **MESSAGE FOR DIRECT MEMORY OPERATIONS** 

Inventors: Georgios Chrysanthakopoulos et al. Docket No.: MSFT121368 DRAFT MSFT-1-21368 24/24 **400** Fig.4I. THE NETWORK MANAGER ENCAPSULATES THE SERIALIZED 478 MESSAGE IN A TRANSMISSION PROTOCOL, SUCH AS TCP, AND SENDS THE SERIALIZED MESSAGE TO A NETWORK A SECOND NETWORK MANAGER IN A SECOND COMPUTING 480 MACHINE RECEIVES THE SERIALIZED MESSAGE ENCAPSULATED IN THE TRANSMISSION PROTOCOL 482 THE SECOND NETWORK MANAGER EXTRACTS THE SERIALIZED MESSAGE USING THE RDMA PROCESSOR, THE SECOND NETWORK 484 MANAGER RESOLVES THE TAGS REFERENCING THE BUFFERS IN THE MEMORY OF THE SECOND COMPUTER SYSTEM THE SECOND NETWORK MANAGER 486 DESESERALIZES THE SERIALIZED **MESSAGE**